

Kevin M. Bakker

Curriculum Vitae

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infectious diseases, environmental drivers, spatiotemporal population dynamics, statistical inference, mathematical modeling, seasonality, and immunization

Postdoctoral Experience

05/2018–04/2021 **NIH F32 Research Fellow**, UNIVERSITY OF MICHIGAN, Ann Arbor, MI, Department of Statistics.

I am utilizing modeling approaches with historical Wild Poliovirus (WPV) incidence data to identify the mechanism(s) which are most strongly associated with historical WPV transmission across Africa, Asia, the Middle East, Europe, and the Americas. This work will result in mathematical transmission models that can be used to identify the ideal timing for immunization or mop-up campaigns, to maximize Oral Polio Vaccine coverage via indirect shedding. Mentor: Edward Ionides.

09/2017–04/2018 **Postdoctoral Researcher**, UNIVERSITY OF GLASGOW, Glasgow, Scotland, Institute of Biodiversity, Animal Health and Comparative Medicine.

Analyzed multiple years of vampire bat mark/recapture data and a field biomarker study to examine whether spreadable vaccines, rather than culling, could better reduce rabies spread across Latin America. Mentor: Daniel Streicker.

Education

09/2013–08/2017 **Ph.D.**, THE UNIVERSITY OF MICHIGAN, Ecology and Evolutionary Biology, Michigan Institute for Computational Discovery & Engineering Certificate.

09/2012–12/2014 **Master of Science**, THE UNIVERSITY OF MICHIGAN, Ecology and Evolutionary Biology.

05/2005–04/2006 **Bachelor of Science**, MICHIGAN STATE UNIVERSITY, Zoology.

09/2000–12/2004 **Bachelor of Science**, MICHIGAN STATE UNIVERSITY, Human Biology.

Publications *In Prep or Submitted*

Kevin M Bakker, Marisa E Eisenberg, Robert Woods, and Micaela E Martinez. “Seasonal transmission and viral reactivation: a case study of chickenpox & shingles”. (available upon request)

Kevin M Bakker. “Comparing VZV transmission and reactivation dynamics under multiple vaccination regimes” (available upon request)

Abigail Collingwood and **Kevin M Bakker**. “Spatiotemporal dynamics of scrub typhus in Thailand from 2003-2018” (available upon request, [^]Bakker lab member)

Refereed Publications

[6] M Brock Fenton, Daniel G Streicker, Paul A Racey, Merlin D Tuttle, Rodrigo A Medellin, Mark J Daley, Sergio Recuenco, and **Kevin M Bakker**. “Knowledge gaps about rabies transmission from vampire bats to humans”. In: *Nature Ecology & Evolution* (2020), pp. 1–2.

- [5] **Kevin M Bakker**, Tonie E Rocke, Jorge E Osorio, Rachel C Abbott, Carlos Tello, Jorge E Carrera, William Valderrama, Carlos Shiva, Nestor Falcon, and Daniel G Streicker. “Fluorescent biomarkers demonstrate prospects for spreadable vaccines to control disease transmission in wild bats”. In: *Nature Ecology & Evolution* (2019), pp. 1–8.
- [4] **Kevin M Bakker**, Micaela Elvira Martinez-Bakker, Barbara Helm, and Tyler J Stevenson. “Digital epidemiology reveals global childhood disease seasonality and the effects of immunization”. In: *Proceedings of the National Academy of Sciences* 113.24 (2016), pp. 6689–6694.
- [3] *Micaela Martinez-Bakker, ***Kevin M Bakker**, Aaron A King, and Pejman Rohani. “Human Birth Seasonality: Latitudinal Gradient and Interplay with Childhood Disease Dynamics”. In: *Proceedings of the Royal Society B: Biological Sciences* 281.1783 (2014), *Co–first authors.
- [2] Laura Alonso-Sáez, Alison S Waller, Daniel R Mende, **Kevin Bakker**, Hanna Farnelid, Patricia L Yager, Connie Lovejoy, Jean-Éric Tremblay, Marianne Potvin, Friederike Heinrich, et al. “Role for urea in nitrification by polar marine Archaea”. In: *Proceedings of the National Academy of Sciences* 109.44 (2012), pp. 17989–17994.
- [1] Jean-François Ghiglione, Pierre E Galand, Thomas Pommier, Carlos Pedrós-Alió, Elizabeth W Maas, **Kevin Bakker**, Stefan Bertilson, David L Kirchman, Connie Lovejoy, Patricia L Yager, et al. “Pole-to-pole biogeography of surface and deep marine bacterial communities”. In: *Proceedings of the National Academy of Sciences* 109.43 (2012), pp. 17633–17638.

Unrefereed Publications

- 2018 **'Tis the Season for Conception**, *The Conversation*, Micaela Martinez and **Kevin M Bakker**.
- 2013 **The Chukchi Sea**, *Biomes and Ecosystems: An Encyclopedia*, Salem Press, ed: Robert Warren Howarth.

Grants & Fellowships Awarded

- 2020–2025 **\$6,000** University of Michigan Data Acquisition for Data Science
- 2020–2022 **\$85,000** University of Michigan Post Translational Scholars Program
- 2019–2020 **\$3,009** XSEDE Supercomputer Startup Funding (2 awards)
- 2018–2021 **\$184,818** NIH National Research Service Award F32AI134016
- 2016–2019 **\$3,000** University of Michigan, Undergraduate Research Opportunity Grant (2 awards)
- 2016–2017 **\$47,400** University of Michigan Rackham Predoctoral Fellowship
- 2014–2017 **\$10,775** University of Michigan Ecology and Evolutionary Biology Grants (7 awards)
- 2013-2017 **\$9,250** University of Michigan Rackham Grants (6 awards)
- 2015 **\$4,000** University of Michigan, Michigan Institute for Computational Discovery and Engineering Fellowship
- 2015 **\$1,350** University of Washington Summer Institute in Statistics and Modeling in Infectious Diseases Summer Institute Grant

Teaching

- Fall 2012, University of Michigan, Introduction to Ecology and Evolutionary Biology
- Fall 2015,
- Winter 2016
- Winter 2013 University of Michigan, Ecology and Evolution of Infectious diseases

Media (hyperlinks)

- Fox News
- Slate Magazine
- LiveScience – Birth Seas
- LiveScience – Digital Epi
- Business Insider
- MedPageToday
- UMich – Biogeography
- Science
- The Pharmaceutical Journal
- AAAS Radio
- ResearchGate News
- ABC News
- Medical Economics
- UMich – Birth Seasonality
- Discovery News
- Boston Globe
- New Scientist
- Michigan Radio
- The Express
- UMich – Digital Epi
- UMich – Vampire Bats
- Digital Trends
- Medical Daily
- Daily Mail
- NBC News
- The Scotsman
- Photonics
- Freethink

National and International Conference Presentations

- 2020 **Bakker, K.M.** and D. Streicker. Ecology and Evolution of Infectious Diseases. Montpellier, France *Cancelled - COVID-19*
- 2019 **Bakker, K.M.** and D. Streicker. Ecological Society of America. Louisville, KY
- 2017 **Bakker, K.M.** and M. Martinez. Jacques Monod: Open Questions in Disease Ecology and Evolution: From Basic Research to Evolutionary Medicine. Roscoff, France
- 2017 **Bakker, K.M.** and D. Streicker. Ecological Society of America. Portland, OR
- 2017 **Bakker, K.M.** and M. Martinez. Ecology and Evolution of Infectious Diseases. Santa Barbara, CA
- 2016 **Bakker, K.M.**, M. Martinez-Bakker, B. Helm, and T.J. Stephenson. Ecology and Evolution of Infectious Diseases. Ithaca, NY
- 2015 **Bakker, K.M.**, M. Martinez-Bakker, B. Helm, and T.J. Stephenson. British Ecological Society. Edinburgh, Scotland
- 2015 **Bakker, K.M.** and M. Pascual. Ecological Society of America. Baltimore, MD
- 2014 **Bakker, K.M.** and P. Rohani. Ecological Society of America. Sacramento, CA
- 2014 **Bakker, K.M.** and P. Rohani. Ecology and Evolution of Infectious Diseases. Fort Collins, CO
- 2013 **Bakker, K.M.**, Martinez-Bakker, M., King, A.A., and P. Rohani. Ecology and Evolution of Infectious Diseases. State College, PA

Invited Talks

- 2020 (*upcoming*) Max Planck Institute for Infection Biology. Berlin, Germany
- 2020 Epidemiology Department, School of Public Health. Ann Arbor, MI
- 2019 MAC-EPID Workshop Meeting, School of Public Health. Ann Arbor, MI
- 2019 School of Mathematics and Statistics. Glasgow, Scotland
- 2018 Complex Systems Networks Group. Ann Arbor, MI
- 2017 Disease Ecology and Wild Immunology. Glasgow, Scotland
- 2017 Department of Ecology and Evolutionary Biology Seminar Speaker. Ann Arbor, MI
- 2016 Odum School of Ecology. Athens, GA
- 2015 Institute for Disease Modeling. Seattle, WA

Local and Other Presentations

- 2016 **Bakker, K.M.** *pomp* in R, a tutorial. Ann Arbor, MI
- 2016 **Bakker, K.M.**, M. Martinez-Bakker, B. Helm, and T.J. Stevenson. Michigan Institute of Computational Discovery and Engineering. Ann Arbor, MI

- 2016 **Bakker, K.M.** Modeling Infectious Diseases Across Scales. Ann Arbor, MI
- 2015 **Bakker, K.M.** and M. Pascual. Computational Discovery in Complex Systems Biology. Ann Arbor, MI
- 2015 **Bakker, K.M.**, E. Ionides, M. Eisenberg, and M. Pascual. Early Career Scientist Symposium. Ann Arbor, MI
- 2014 **Bakker, K.M.** Student Evaluation Seminar Talk. Ann Arbor, MI
- 2014 **Bakker, K.M.** 5 Minute Speed Talk — Recruitment Weekend. Ann Arbor, MI
- 2014 **Bakker, K.M.** 5 Minute Speed Talk — Departmental Seminar. Ann Arbor, MI
- 2014 **Bakker, K.M.** Theory Group Seminar Talk. Ann Arbor, MI

Students Mentored

- 2018-2020 Clare Dougherty, UROP, Independent study, Lab technician
- 2019-2020 Abigail Collingwood, Masters Capstone
- 2019-2020 Juliette Kaplan, UROP
- 2019-2020 Cerys Rogers, UROP
- 2019-2020 Mahir Piyarali, UROP
- 2019 Erica Fossee, UROP
- 2018-2019 Victoria Minka, UROP, Independent study
- 2016-2019 Alyah Chmiel, Independent study, Lab manager
- 2016,2019 Lauren Rollins, Independent study
- 2018 Ariana Mitchum, MRADS
- 2016-2018 Logan Austin, Independent study
- 2016-2017 Nathan Warriner, UROP & Independent study
- 2016-2017 Madeleine Schmitter, UROP
- 2016-2017 Molly Stachurski, UROP
- 2016 Aidan O'Connor, Independent study
- 2015 Emilia Iglesias, Independent study
- 2014 Tabea Schatz, Volunteer

Research Experience

- 05/2018–present **University of Michigan**, Semi-transmissible vaccines, *panelPomp*, *spatPomp*, optical character recognition software.
- 09/2017–04/2018 **University of Glasgow**, Wildlife disease modeling, transferable vaccines, model validation with serological data.
- 12/2010–08/2017 **University of Michigan**, Disease modeling, statistical methods, and *pomp* (Partially observed Markov Process) model fitting with extensive coding experience with R, C++, and \LaTeX .
- 08/2007–10/2010 **University of Georgia**, Set up and ran CARD-MAR-FISH and DNA sequencing labs, 650+ hours on Fluorescent microscope, trained in PCR, qPCR, DNA extraction, and other microbial and molecular lab techniques.
- 07/2008 **Uppsala University, Sweden**, Learned MAR-FISH technique to identify bacterial activity and community structure.
- 05/2008–06/2008 **Interdisciplinary sea ice research course (MSL 695) in Barrow, Alaska**, Intensive course on data analysis and collection involving fieldwork, volunteered for an additional week to collect genetic samples of Ringed Seals.

- 11/2007–01/2008 & 11/2008–01/2009 **Antarctic research cruises aboard the Swedish Icebreaker Oden**, Research focus on the Southern Oceans bacterial community structure, collected organic matter through for DOM/POM analysis, DNA samples filtered for later extraction and 454 sequencing, respiration bottles filled for CO₂ analysis, MAR-CARD-FISH samples produced from separate filtration process.
- 05/2006 **Bahamas summer study**, Marine fish, coral, and invertebrate identification/physiology, studied the behavior, reproduction, competition and feeding of marine organisms, sea urchin research project on the inverse relationship between test size and population density.
- 05/2005 **Ecology Lab–Kellogg Biological Station**, Research orientated course revolving around planning and implementing field experiments and conducting data analyses.
- 12/2005–01/2006 **Antarctic research cruise aboard the Russian Icebreaker M/S Orlova**, Southern Ocean circulation, chemistry, food webs, and organism interactions, research project on human interactions and their impact on the environment.
- 05/2003–06/2003 **Belize summer study**, Tropical and marine ecology, research project outlining human impact on the coastal ecosystem.

Service, Outreach, & Workshops

- 08/2015–12/2015 **University of Michigan**, Graduate Student Mentor: Mentored six new Graduate Student Instructors.
- 08/2015 **Ecological Society of America**, Served as ESA student Mentor for Disease Ecology.
- 07/2015 **University of Washington**, Summer Institute in Statistics and Modeling Infectious Disease (SISMID): Simulation Based Inference for Epidemiological Dynamics and Spatial Statistics.
- 07/2015 **Chumakov Institute of Poliomyelitis (Moscow, Russia)**, Visit, data collection, and developing collaborations with Russian polio researchers.
- 03/2015 **Dewitt Middle School (Dewitt, MI)**, Science outreach for 240 students via interactive learning on the scientific method, global demography, and disease ecology.
- 08/2014–07/2015 **University of Michigan**, President - Graduate students in Ecology & Evolutionary Biology (GREEBS). Activities included: Organization of Coffee-Match, Advanced R workshop, Grad Hacks workshop, and Professional development workshops with Robert Woods, Elizabeth Pringle, and Chelsea Wood.
- 04/2014 - 08/2014 **University of Michigan**, Coded all models from *Modeling Infectious Diseases* (ISBN: 9780691116174) in R Programming Language.
- 05/2014 **University of Michigan**, Qualifying exams preparation meeting, lead organizer, and speaker.
- 01/2012–06/2012 **University of Michigan**, Event Leader, 10th annual Ecology and Evolution of Infectious Disease conference and workshop.

Professional Societies

- 2015–present **British Ecological Society**.
- 2010–present **Ecological Society of America**.
- 2009–present **American Geophysical Union**.